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Reply to Office Action of May 10, 2006

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REMARKS

Status of claims

Applicants thank the Examiner for the consideration given to the present application. Claims 15 and 16 have been canceled without prejudice. Claims 1, 2, and 10 have been amended, support of which may be found in the specification and figures. Claims 17-20 have been added to further clarify the invention, support of which may be found in the specification and figures. Claims 1, 2, 4-14, and 17-20 are pending in the present application. No new matter has been added to the claims.

Amendment to the Specification

The Examiner objected to the specification asserting that the Abstract is too brief and does not comply with the guidelines for abstracts. Accordingly, Applicants have amended the Abstract and thus respectfully request the objection to the specification be withdrawn.

Rejections under 35 U.S.C. §112

Claims 15-16 have been rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. The Examiner asserted that the claim contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor had possession of the claimed invention. This rejection is traversed. However, in order to expedite prosecution of the Application, Applicants have canceled claims 15-16 without prejudice. Accordingly, Applicants respectfully submit that the rejection under 35 U.S.C. §112 is now moot.

Rejections under 35 U.S.C. §103

Claims 1-2, 4-12, and 14-16 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Economy et al. (U.S. Patent No. 5,834,114) in view of Buzzelli (U.S. Patent No. 3,650,834). Claims 13-14 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Economy et al. in view of Buzzelli '834, as applied to claim 1, above, and further in view of Buelow et al. (U.S. Patent 6,006,797). The Examiner asserted that Economy et al. teach a method for forming a filter material comprising the steps of:

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- a) coating a fiber with a carbonizable precursor coating;
- b) carbonizing said coating; and
- c) activating said coating.

The Examiner also asserted that Economy et al. is open to the use of other materials that will produce carbonizable coatings. The Examiner further asserted that Buzzelli teaches the formation of an activated carbon electrode, which is formed by charring and activating lignosulfonate. Thus, the Examiner concluded that it would have been obvious to have used the lignosulfonate of Buzzelli as the carbon precursor in place of the phenolic resin of Economy et al. to form a coating on a filter particle. Also, the Examiner asserted that Buelow et al. teach activated carbon compositions with a specific mesopore volume of 0.9 mL/g and a specific macropore volume of 0.15 mL/g and thus teach the sum of mesopore and macropore specific volumes is 1.05 mL/g of claim 13.

Applicants respectfully traverse these rejections and respectfully submit that the burden of establishing a prima facie case of obviousness under §103 has not been met. *MPEP §2145*. In order to establish a prima facie case of obviousness under §103, the Examiner has the burden of showing, by reasoning or evidence, that: 1) there is some suggestion or motivation, either in the references themselves or in the knowledge available in the art, to modify that reference's teachings; 2) there is a reasonable expectation on the part of one of ordinary skill in the art that the modification or combination has a reasonable expectation of success; and 3) the prior art references (or references when combined) teach or suggest all the claim limitations. *MPEP §2145*. The Federal Court has held, "Particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed." *In re Kotzab*, 217 F.3d 1365, 2371 (Fed. Cir. 2000). "In other words, the examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed." *In re Rouffet*, 149 F.3d 1350, 1357 (Fed Cir. 1998).

A. A Prima Facie Case Of Obviousness Has Not Been Met Regarding Claims 1 and 20

No where in Economy et al. or Buzzelli, singularly or in combination, is there a teaching, suggestion, or motivation to provide the invention in the manner claimed. Applicants'

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independent claim 1 recites a process for forming a filter material that includes, *inter alia*, the step of applying an aqueous lignosulfonate coating onto a filter particle. Applicants' independent claim 17 recites a process for forming a filter material that includes, *inter alia*, the step of carbonizing the coating at a temperature from 600°C to about 900°C. Also, Applicants' independent claim 20 recites a process for forming a filter material that includes, *inter alia*, the following steps: forming an aqueous lignosulfonate solution, mixing the aqueous lignosulfonate solution with filter particles to form aqueous lignosulfonate-coated filter particles, and carbonizing the aqueous lignosulfonate-coated filter particles in a furnace at a temperature from 600°C to about 900°C.

1. No Motivation Or Suggestion To Combine Buzzelli With Economy Et Al.

Applicants respectfully submit that neither the references themselves nor the knowledge in the art provide one skilled in the art a motivation or suggestion to combine Buzzelli with Economy et al. to attempt to form Applicants' claimed invention. With regards to Applicants' independent claims 1 and 20, Economy et al. teach a coating made from a phenolic resin that may be mixed in an ethanol solution. (Col. 3, lines 19-20). In addition, although Economy et al. state that "other resins will produce a reasonable concentration of chars" such as coal, wood, etc., Economy et al. do not explicitly teach or suggest lignosulfonates may be used or be suitable for mixing with Economy et al.'s ethanol solution, let alone, for mixing with water to form an aqueous lignosulfonate solution or coating to form a coating on the filter particles, carbonized, and then activated as recited in claims 1 and 20.

In an attempt to overcome this deficiency of Economy et al., the Examiner asserts that one of ordinary skill in the art would have been motivated to look to Buzzelli because Buzzelli teaches the formation of a battery electrode by charring (i.e., carbonizing) and activating a solid lignosulfonate. The Examiner further states that the reference further teaches that activated carbons may be formed from "Most carbon-containing substances" by charring, including wood char, coal, etc. However, Applicants submit that Buzzelli is completely void of any teaching on coatings or liquid lignosulfonate, let alone coatings made from an aqueous lignosulfonate for coating a filter particle as claimed by the Applicants. Applicants further submit that although Economy et al. teach coating a filter particle with a phenolic resin-ethanol solution, Economy et al. teach mixing the phenolic resin with an ethanol solution, not water as claimed by Applicants.

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Moreover, Economy et al.'s coating requires an additional step of cross linking the coating in order to maintain the coating on the filter particles. Such additional cross-linking step is not required in the Applicants' invention to form the coating for the filter material.

In addition, Applicants submit that Buzzelli only teaches that a cathode for a battery may be derived from a carbonized and activated solid, sodium lignosulfonate (col. 2, lines 12-16), but this does not necessarily teach, or even suggest, that sodium lignosulfonate may effectively be combined with Economy et al.'s ethanol solution to form a coating on a filter particle, and once combined, that the lignosulfonate-ethanol solution can still be effectively carbonized and activated to form a coated filter material. Moreover, Applicants submit that one of ordinary skill in the art would not be motivated to combine Economy et al. and Buzzelli because neither teach, or even suggest, singularly or in combination, mixing a lignosulfonate with water. Thus, Applicants respectfully submit that neither Economy et al. nor Buzzelli, singularly or in combination, provide one of ordinary skill in the art any motivation or suggestion to combine the two. Therefore, with no showing of a motivation or suggestion to combine, Applicants submit that the Examiner has used Applicants' own teachings against them. The Federal Circuit has held, "Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references." *In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999). Applicants respectfully submit that this requirement for a showing of a teaching or motivation to combine has not been met by the Examiner.

2. No Reasonable Likelihood Of Success Combining Buzzelli With Economy Et Al.

Applicants submit that one of ordinary skill in the art would have no reasonable expectation of success that the combination of Buzzelli's solid, lignosulfonate with water would form a coating on a filter particle. As set forth above, neither Economy et al. nor Buzzelli teach or suggest, singularly or in combination, an aqueous solution to mix with any activated carbon materials, let alone lignosulfonate as claimed by Applicants. In fact, one of ordinary skill in the art would have no reasonable expectation of success that the combination of Buzzelli's solid, lignosulfonate with Economy et al.'s ethanol solution as asserted by the Examiner would form a coating on a filter particle. In fact, Applicants submit that the combined teachings of Economy

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et al. and Buzzelli would require one skilled in the art at the time of the invention to try numerous, if not infinite, parameters to achieve the invention as claimed by Applicants.

"One cannot base obviousness upon what a person skilled in the art might try or might find obvious but rather must consider what the prior art would have led a person skilled in the art to do." *In re Tomlinson*, 150 USPQ 623 (CCPA 1966). An improper 'obvious to try' rationale is being applied when one skilled in the art would have "to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or **no direction as to which of many possible choices is likely to be successful**". See *MPEP 2145(X)(B)*. Here, Economy et al. teach activated carbon coatings for filter particles and that "other resins that will produce a reasonable concentration of chars" may be used such as coal and wood. The term, "resin" is not defined within the specification of Economy et al. It is defined in the American Heritage Dictionary® as "Any of numerous clear to translucent yellow or brown, solid or semisolid, viscous substances of plant origin, such as copal, rosin, and amber, used principally in lacquers, varnishes, inks, adhesives, synthetic plastics, and pharmaceuticals; or any of numerous physically similar polymerized synthetics or chemically modified natural resins including thermoplastic materials such as polyvinyl, polystyrene, and polyethylene and thermosetting materials such as polyesters, epoxies, and silicones that are used with fillers, stabilizers, pigments, and other components to form plastics." ¹ In addition, the term, "char" is defined in the American Heritage Dictionary® as "A substance that has been scorched, burned, or reduced to charcoal." ² Moreover, many polymers (resins) can be carbonized and activated, but that does not necessarily mean that such an activated, carbonized polymer will effectively coat a filter particle. Alternatively, when carbonized and activated, some polymers cannot stay as coatings because the act of carbonization and activation effectively destroys too much of the polymer.

In addition, in teaching what materials the battery cathode may be derived from, Buzzelli states, "The carbon employed in the present invention may be derived from such material as activated petroleum coke, wood char, activated sodium lignosulfonate char, activated bituminous coal, polyvinylidene chloride char, polyacrylonitrile char and the like." (col. 2, lines 12-16).

¹ The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2004, 2000 by Houghton Mifflin Company. Published by Houghton Mifflin Company.

² *Id.*

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Buzzelli further teaches that graphite may also be used for cathode fabrication. (col. 2, lines 17-19). Buzzelli teaches a variety of different materials that may be carbonized and activated to form a cathode, but offer one of ordinary skill in the art no suggestion or teaching for forming a solution or coating with these material or success in combining any of these numerous materials, including lignosulfonate, with either an ethanol solution as taught in Economy et al. or water as claimed by Applicants prior to carbonization and activation.

Thus, if one of ordinary skill in the art would randomly pick sodium lignosulfonate out of the numerous different materials suggested in Buzzelli and attempted to combine it with Economy et al.'s ethanol solution to make a coating to be applied to a filter particle, one skilled in the art would still have no reasonable expectation of success because neither reference, singularly or in combination, teach or suggest that lignosulfonate can be mixed with ethanol, let alone water, to form a coating that may be applied to a filter particle or that a lignosulfonate-ethanol combination or an aqueous lignosulfonate solution can be carbonized and activated.

For example, Applicants believe that lignosulfonate cannot dissolve within ethanol and thus may not form an effective coating capable of being applied to a filter particle. In addition, once combined, the lignosulfonate-ethanol combination may or may not be carbonized and/or activated. Also, if the attempt is made to carbonize and activate the lignosulfonate-ethanol combination, the lignosulfonate-ethanol combination may or may not be able to form a coating on the filter particles. Such carbonization and activation process may destroy the lignosulfonate-ethanol combination.

The point is, one of ordinary skill in the art would not know whether the combination of Buzzelli's solid, lignosulfonate with Economy et al.'s ethanol solution, let alone Buzzelli's solid, lignosulfonate with water, would effectively form a coating on a filter particle (i.e., would not have a reasonable expectation of success), and be capable of being carbonized and activated to form a filter material based upon the combined teachings of these references. Thus, Applicants submit that the references, singularly or in combination, do not provide one of ordinary skill in the art a reasonable expectation of success. This assumption to combine Buzzelli's solid, lignosulfonate with Economy et al.'s ethanol seems to Applicants to be a leap of faith by the Examiner or based solely upon Applicants' own teachings. Either way, such assumptions or conclusions, without teaching or suggestions, are improper. *MPEP 2145; In re Dembiczuk*.

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3. Buzzelli Combined with Economy Et Al. Do Not Teach Or Suggest All Of Claim Limitations.

Applicants respectfully submit that assuming, *arguendo*, that one skilled in the art would look to Buzzelli's solid, lignosulfonate-cathode and combine it with Economy et al.'s ethanol as asserted by the Examiner, this combination still does not teach or suggest all of the limitations of Applicants' claims 1 and 20. The prior art references (singularly or in combination) must teach all the claim limitations. *MPEP 2145*. Particularly, neither reference teach or suggest (singularly or in combination) the limitation "applying an aqueous lignosulfonate coating onto a filter particle" as recited in claim 1 and the limitations "forming an aqueous lignosulfonate solution", "mixing the aqueous lignosulfonate solution with filter particles to form aqueous lignosulfonate-coated filter particles", and "carbonizing the aqueous lignosulfonate-coated filter particles in a furnace at a temperature from 600°C to about 900°C."

As set forth above, Economy et al. teach a coating made from a phenolic resin mixed in an ethanol solution. (Col. 3, lines 19-20) and state that "other resins will produce a reasonable concentration of chars" such as coal, wood, etc. Moreover, Economy et al.'s phenolic-ethanol solution requires an additional step of cross-linking to form an effective coating, which Applicants' invention does not require to form a coated filter material. As also set forth above, Buzzelli is void of any teaching or suggestion on diluting its lignosulfonate with water, or any liquid, to form an aqueous lignosulfonate solution or coating. Instead, Buzzelli teaches forming the carbon-containing substance into the form of a plate, foil, or compacted powder. In sharp contrast, Applicants' claims 1 and 20 recite applying or forming an aqueous lignosulfonate coating to an underlying substrate (i.e., the filter particles). Assuming for arguments sake that one skilled in the art would be motivated to combine Economy et al. and Buzzelli, one of ordinary skill in the art would be motivated to replace the coated fiber of Economy et al. with a pure carbon fiber made from lignosulfonate in view of Buzzelli's teaching or to combine Buzzelli's solid, sodium lignosulfonate with Economy et al's ethanol solution. In either scenario, the references, singularly or in combination, do not teach or suggest applying or forming an aqueous lignosulfonate solution or coating as claimed by the Applicants.

Also, Applicants submit that ethanol and water are completely different liquids with completely different properties. As such, each will react differently when combined with

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lignosulfonate and when an attempt is made to carbonize and activate the combination. In fact, Applicants believe that lignosulfonate will not even dissolve within an ethanol solution and thus would be incapable of forming a suitable coating to be applied to filter particles. In addition, both references are void of any teaching or suggestion regarding whether lignosulfonate may be carbonized and activated, once combined with ethanol. Applicants respectfully submit that the Examiner has made these unfounded assumptions based upon Applicants' own teachings, which is improper and not in accordance with the law. *MPEP 2145; In re Dembiczak*. Also, Applicants submit that Bulow et al. is completely void of any teaching or suggestion as to applying or forming aqueous lignosulfonate coatings to a filter particle(s). Therefore, Applicants submit that the asserted combination of Economy et al., Buzzelli and/or Bulow et al. do not teach, or even suggest, singularly or in combination, Applicants' claimed steps of "applying an aqueous lignosulfonate coating" or "forming an aqueous lignosulfonate solution" as recited in claims 1 and 20, respectively.

Moreover, Applicants submit that none of the references teach or suggest, singularly or in combination, Applicants' step of carbonizing the coating at a temperature from 600°C to about 900°C as recited in claim 20. In contrast, Economy et al. teaches curing its phenolic resin coating by heating it to about 165°C (Col. 3, lines 29-31), while Buzzelli teaches carbonizing its carbon electrode at a temperature below 600°C (Col. 2, lines 1-2). Moreover, Bulow et al. is completely void of any teaching or suggestion regarding carbonizing a coating at a temperature from 600°C to about 900°C. Thus, none of the references teach or suggest, singularly or in combination, a step of carbonizing the coating at a temperature at or above 600°C, let alone from 600°C to about 900°C as recited in Applicants' claim 20.

Therefore, Applicants respectfully submit that none of the references teach or suggest, singularly or in combination, Applicants' claim limitations of applying an aqueous lignosulfonate coating onto a filter particle and forming an aqueous lignosulfonate solution, mixing the aqueous lignosulfonate solution with filter particles to form aqueous lignosulfonate-coated filter particles, and carbonizing the aqueous lignosulfonate-coated filter particles in a furnace at a temperature from 600°C to about 900°C as recited in claims 1 and 20, respectively. Accordingly, Applicants respectfully request the rejections of claims 1 and 20 under 35 U.S.C. 103 be withdrawn. As

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claims 2 and 4-14 depend from independent claim 1, Applicants respectfully request the rejection of these claims under 35 U.S.C. 103 be withdrawn as well.

B. The Burden of Prima Facie Case Of Obviousness Not Met Regarding Claim 17

Finally, Applicants submit that none of the references teach or suggest, singularly or in combination, Applicants' process recited in claim 17. Particularly, claim 17 recites a process for forming a filter material, consisting of:

- a) coating a filter particle with a lignosulfonate;
- b) drying said coating;
- c) carbonizing the coating at a temperature from 600°C to about 900°C; and
- d) activating the coating.

First, as set forth above, Economy et al. teaches and requires a step of cross-linking the coating to form its coating on a filter material. Applicants submit that since claim 17 recites the phrase "consisting of", their claimed process excludes any additional steps in forming a filter material, such as the required cross-linking step taught by Economy et al. In addition, neither Buzzelli nor Bulow et al. teach or suggest, singularly or in combination, a process for forming a filter material without a cross-linking step consisting of the recited limitations, such as, for example, "coating a filter particle with lignosulfonate" or "carbonizing the coating at a temperature from 600°C to about 900°C."

Moreover, none of the references (Economy et al., Buzzelli, Bulow et al.) teach or suggest Applicants' limitation of "carbonizing the coating at a temperature from 600°C to about 900°C" as recited in claim 17. Economy et al. teaches curing its phenolic resin coating by heating it to about 165°C (Col. 3, lines 29-31). Buzzelli teaches carbonizing its carbon electrode at a temperature below 600°C (Col. 2, lines 1-2), while Bulow et al. is completely void of any teaching or suggestion regarding carbonizing a coating at a temperature from 600°C to about 900°C. Thus, none of the references teach or suggest, singularly or in combination, a step of carbonizing the coating at a temperature at or above 600°C, let alone from 600°C to about 900°C as recited in Applicants' claim 17.

Therefore, Applicants respectfully submit that Economy et al., Buzzelli, and/or Bulow et al. do not teach or suggest, singularly or in combination, Applicants' a process for forming a

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filter material, consisting of coating a filter particle with a lignosulfonate, drying said coating, carbonizing the coating at a temperature from 600°C to about 900°C, and activating the coating. Accordingly, Applicants request that the rejections under 35 U.S.C. §103 of independent claim 17 be withdrawn. As claims 18 and 19 depend from claim 17, the rejection of these claims under 35 U.S.C. §103 should be withdrawn as well.

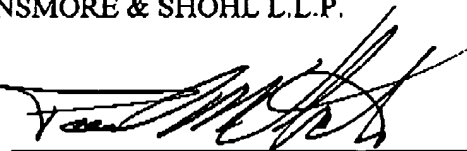
Double Patenting

Applicants would like to thank the Examiner for his review and acceptance of the Terminal Disclaimer filed on 2/27/06 in response to the previous Double patenting rejections.

CONCLUSION

Applicants respectfully submit that the present application is in condition for allowance. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the application or of this response. Otherwise, early notification of allowable subject matter is respectfully solicited.

Respectfully submitted,
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